STUDY OF CCS PILOT TECHNOLOGIES FOR COAL FIRED POWER PLANTS IN THE CZECH REPUBLIC

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CO-OPERATION IN RESEARCH AND DEVELOPMENT OF CARBON CAPTURE AND STORAGE TECHNOLOGIES
12. 10. 2016, Scandic Solli Hotel, Oslo, Norway

Project Introduction I.

Programme Norway Grants 2009-2014

CZ08 – Carbon Capture and Storage

Project Name

Study Of CSS Pilot Technologies for Coal Fired Power Plants in the Czech Republic

Implementation time

1. 1. 2015 – 31. 12. 2016

Project budget

CZK 22 669 484 (≈ 7 500 000 NOK)

Programme Operator

Ministry of Finance CR

Project partners

CTU in Prague FME (Tomas Dlouhy, Assoc. Prof.)

UJV Rez, a. s. (Lukas Pilar, Ph.D.)

SINTEF Energi AS (Jana P. Jakobsen, Ph.D.)

Project Introduction II.

involved administators and researchers

37 (32 researchers)

19 - CTU in Prague

13 - SINTEF ER

5 – UJV Rez

PREVIOUS PROJECT

project name

FR-TI1/379 „Research a development of methods and techniques for CO_2 capture in fossil fuel power plants and its storage to geological formations in the Czech Republic“

project partners

UJV Rez, a.s.

Czech Technical University in Prague, Faculty of Mechanical Eng.

Czech Geology Survey

Main goals of the project

1) **technical and economical assessment of post- a pre-combustion CCS technologies** integrated into IGCC power plant in the Czech Republic. Considered CO_2 capture technologies are:
   - Rectisol wash (pre-combustion)
   - Polymeric membranes (pre-combustion)
   - Cryogenic/Low temperature capture (pre-combustion)
   - Ca-Looping (post-combustion)
2) **technical and economical study of captured CO_2 transport** (gas/liquid) to the storage in the Czech Republic (on-shore) and in the North Sea (off-shore)
3) **comparison with results from previous project (FR-TI/379)** which analysed the integration of **oxyfuel** and **ammonia scrubbing post combustion** CCS technologies into 250 MWe coal fired power plant with subcritical parameters in the Czech Republic
4) **extension of bilateral cooperation between the Czech Republic and Norway** in the field of research and technical-economic assessment of CCS technologies

Project structure

project activities

- 7 project activities/workpackages
  - WP0 – Management
  - WP1 – Input Analysis
  - WP2 – Process system design
  - WP3 – Technical-economic assessment
  - WP4 – Results analysis and future recommendations
  - WP5 – CO2 transport and evaluation of whole chain
  - WP6 – IGCC with post-combustion – Ca-Looping

project indicators

- 19 indicators
  - 7 technical reports
  - 2 paper manuscripts in reviewed journals
  - 6 presentations on conferences
  - 1 software for economic evaluation in Excel platform
  - 3 publicity events (organized seminars and conferences)

Main goals of project workpackages/activities I.

WP1 – Input analysis

- definition of input conditions for pre-combustion CCS plant design and analysis
- summary of findings from previous study FR-TI/379 targeted to CCS oxyfuel and post-combustion technologies

Results preseted on:

2 conferences (8th Trondheim CCS conference, ERIN 2015)

2 seminars (opening seminar in Prague, public workshop in Prague)

WP2 – Process system design

- design of base process diagram for the system with and without pre-combustion CCS technology
- selection of suit technologies for partial units of power plant with and without CCS technology

Main goals of project workpackages/activities II.

Results presented on:

4 conferences (ICCT 2016, CENERGI 2016, 8th Trondheim CCS conference, SCCPE)

1 public workshop

WP3 – Technical-economic Assessment

- optimization of parameters in designed process diagram of pre-combustion CCS technology utilizing Czech lignite
- economic assessment of designed system

Results presented on:

9 conferences (Kotle a energeticka zarizeni, ICCT, ERIN, Energeticky seminar, CO2 Summit II, 8th Trondheim CCS conference, SCCPE, Freibergh IGCC conference tc.)

Main goals of project workpackages/activities III.

WP4 - Results analysis and future recommendations

- evaluation of results and comparison with parameters of others CCS technologies for Czech lignite obtained in previous studies

WP5 - CO_2 transport and whole chain assessment

- technical-economic analysis of CO2 transport to the suitable storage

Results presented on:

2 conferences (Energy System conference, ICCT)

WP6 - IGCC with post-combustion - Ca looping

- design and technical-economic evaluation of the integration of post-combustion CCS technology based on Ca-looping in IGCC power plant

Results presented on:

1 conferences (SCCPE)

Project Publicity

- organized seminars/conferences

- 4 events (3 in the Czech Rep., 1 in Norway)

1. **Opening seminar**
   – 10th April 2015, Prague, CR
2. **Public workshop**
   – 4th Novembeber 2015, Prague, CR
3. **Joint seminar in Oslo**
   – 12th October 2016, Oslo, Norway
4. **Joint conference in Prague**
   – 7th-8th November 2016, Prague, CR

Project Publicity II.

- presentation of results on conferences

15 conferences

8 Czech conferences

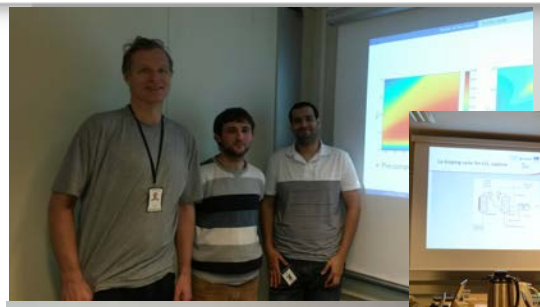
- Kotle a Energeticka zarizeni
- ERIN 2015
- ICCT 2015

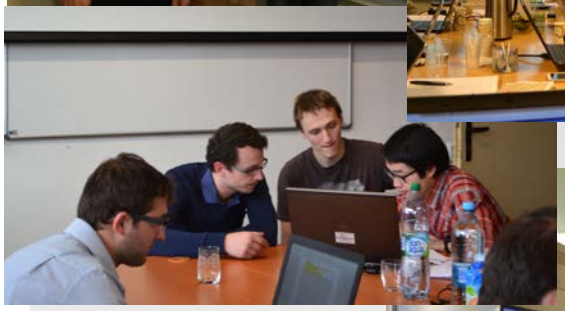
7 international conferences

- 8th Trondheim Carbon Capture Conference
- CO_2 Summit II: Technologies and Opportunities 2016
  - **The Best Poster presentation award**
- SCCPE China
- Freibergh IGCC conference

Bilateral aspects of the project

- workshops/internships/excursion





Study internship - CTU/SINTEF

– 1 member of CTU team – October/November 2015

Workshop/Meeting

8 bilateral workshops

- 4 in Norway, 4 in Prague

Excursions

- 4 excursions
  - 3 power/experimental plants
    - Vresova IGCC plant (CR)
    - Pocerady power plant (CR)
    - Chemical Looping (NO)
  - 1 NTNU/SINTEF Laboratories (NO)

Extension of bilateral cooperation

- other BF Initiatives

Obtaining of support for implementation of 4 initiatives funded from CZ08 BF

1. **NF-CZ08-BFB-1-010-2015**
   Power Gen Asia 2015
   September 2015
2. **NF-CZ08-BFB-1-012-2015**
   Post Combustion Capture Conference
   September 2015
3. **NF-CZ08-BFB-1-011-2015**
   Pittsburgh Coal Conference
   October 2015
4. **NF-CZ08-BFB-1-015-2016**
   CTU Short-Term Study Internship
   September – December 2016

Extension of bilateral cooperation

- other BF Initiatives – plan 2016/2017

1. **Joint seminar at GHGT-13 conference**
   - 14th November 2016, Swiss Convection Center, Lausanne, Switzerland
   - discussion seminar organized in collaboration with REPP-CO2 project and MF CR
2. **GHGT conference**
   - 14th November – 18th November 2016, Swiss Convection Center, Lausanne, Switzerland
   - 3 joint project result presentations (WP3, WP5, WP6)
3. **SINTEF Short-Term Study Internship**
   - December 2016 – March 2017
   - 1 study internship at sofware prediction and modelling of CO_2 transport mixtures properties
4. **CTU Short-Term Study Internship 2017**
   - January – March 2017
   - 2 study Internship at Energy System software modelling
5. **Study for preparation of mutual project for Horizon2020**
   - November 2016 – March 2017
   - preparation of future mutual project for Horizon2020

THANK YOU FOR YOUR ATTENTION

More information about the project:

- **project website:**
  - www.czech-norway-pilotccs.cz
- **project facebook:**
  - https://www.facebook.com/Czech-Norway-Pilot-CCS-1664816420432846**/**
- **project email:**
  - nfccs05@gmail.com